In re Patent Application of:
SHIEH ET AL.
Serial No. 10/715,165
Filed: November 17, 2003

IN THE CLAIMS

Claims 1 to 6 (cancelled).

7. (currently amended) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

a second cladding region positioned on the active region and including a high electrical resistance implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region;

a current spreading region positioned on the second mirror region;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path, the current spreading region having an index guide formed therein; and

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector ~~as claimed in claim 1 further including an index guide formed in the current spreading region~~.

8. (currently amended) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

a second cladding region positioned on the active region and including a high electrical resistance implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region;

a current spreading region positioned on the second mirror region;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path; and

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector, the third mirror region having a notch formed therein ~~as claimed in claim 1 further including a notch formed in the first mirror region~~ to limit a diameter to approximately a primary mode of operation.

9. (currently amended) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

a second cladding region positioned on the active region and including a high electrical resistance implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region;

a current spreading region positioned on the second mirror region;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path;

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector; and,

~~as claimed in claim 1 further including~~ a tunneling junction.

10. (original) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

a second cladding region positioned on the active region and including a high electrical resistance ion implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region including from one to five pairs of alternate mirror layers of a first semiconductor material with a first index of refraction and a second semiconductor material with a second index of refraction;

a current spreading region including a heavily doped semiconductor layer positioned on the second mirror region;

an index guide formed in the current spreading region, the index guide defining a lasing cavity;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path; and

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector.

11. (original) A vertical cavity surface emitting laser as claimed in claim 10 wherein the third mirror region includes a plurality of pairs of one of alternate semiconductor layers and alternate dielectric layers.

Claims 12 to 26 (cancelled).